Wali Hassan P1

Scale=4y

Vector One

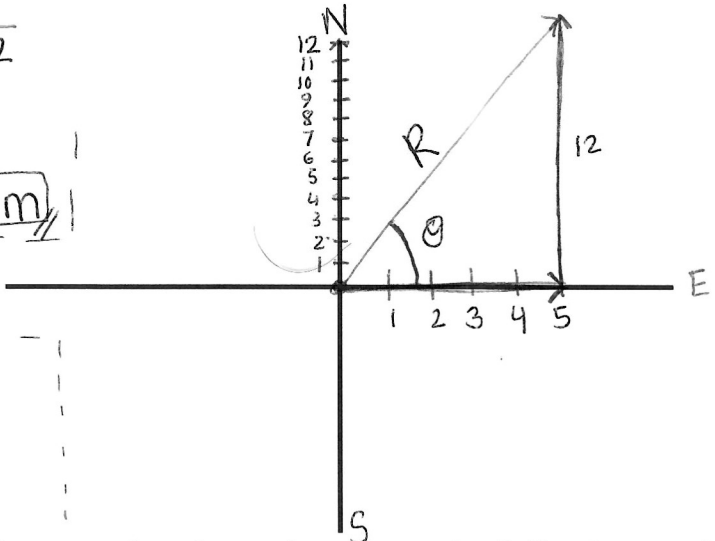
$R = \sqrt{12^2 + 5^2}$

$= 13\ (4x)$

$= 13 \times 4 = \boxed{52\ m}$

$\theta = \tan^{-1}\left(\frac{12}{5}\right)$

$= \boxed{67.38^\circ}$



$R = \sqrt{12^2 + 5^2}$

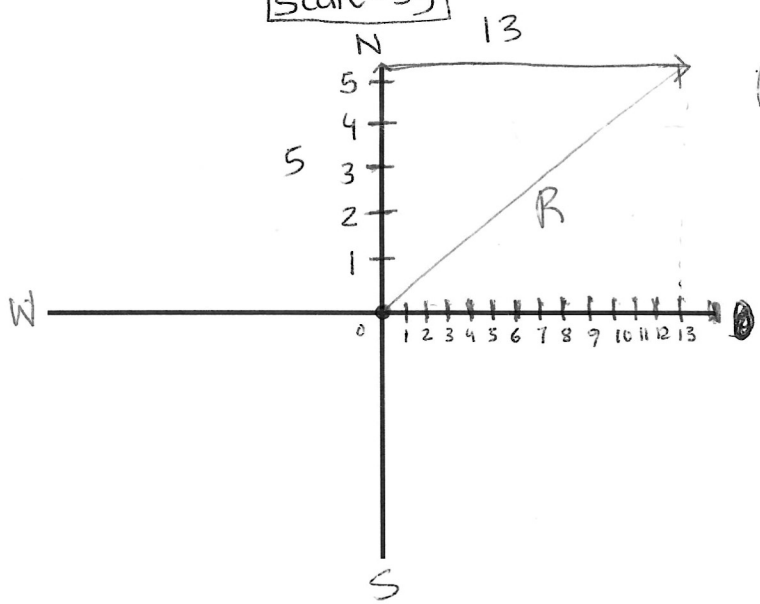
$= 13\ (4x) = 13 \times 4 = 52$

$\theta = 67.38^\circ$

Scale = 4x

1) Using the good vector drawing rules, draw the following problem on the above graph and solve it. (use a primitive scale and then trig to find the angle) A person walks 20 meters to the east and then turns and walks 48 meters to the due north. What is her final distance(displacement) away from her starting point and at what angle relative to the east (x) axis?

Scale=5y



$R = \sqrt{13^2 + 5^2}$

$= \sqrt{194}$

$= 13.928$ (5x) $= \boxed{69.642}$

Scale=5x

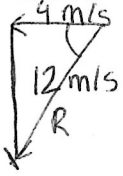
2) Using the good vector drawing rules, draw the following problem on the above graph and solve it. A wind of 20 miles per hour is blowing toward the north and a baseball is hit toward the east at 65 miles per hour. What is the resultant speed of the ball due to the influence of the wind?

3) The river is flowing downstream at 12 m/s. If a swimmer attempts to swim across the river at 4 m/s perpendicular to the flow, what is his new speed and direction?

New speed = $R = \sqrt{12^2 + 4^2} = 12.649$ m/s

direction = $\tan^{-1}\left(\frac{12}{4}\right)$

$= 71.565^\circ$ Southwest.

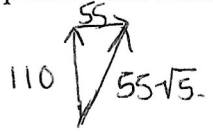


Vector Two

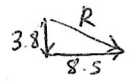
Wafi Hassan

Solve the following problems mathematically but remember that they could be solved graphically as well.

1) A 110 N force acts at a point p due North. A second force of 55 N acts on point *P* due East. What is the resultant force? $R=\sqrt{110^2+55^2} = 55\sqrt{5} = 122.984\,N$

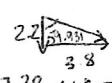


2) A motorboat travels at 8.5 m/s across a 110 m river that flows at a rate of 3.8 m/s. What is the boat's resultant speed? $R=\sqrt{3.8^2+8.5^2} = 9.3107\ m/s$



3) A boat heads directly across a river 41 m wide at 3.8 m/s. The current is flowing at 2.2 m/s. What is the resultant velocity? How much time does it take the boat to cross the river? (hint: the angle of the boat's path can be found by comparing the current, boat velocity and the new boat velocity in a triangle)

$R=\sqrt{3.8^2+2.2^2} = 4.3909\ m/s$ at $\theta=\tan^{-1}\left(\frac{3.8}{2.2}\right) = 59.931°$

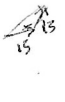


Time = $\frac{41}{4.3909}$ = 9.33 s

Distance = $\frac{41}{\sin(59.93)}$

Time = $\frac{47.38}{4.3909}$ = 10.79 s

4) Two 15 N forces act concurrently on point *P*. Find the magnitude of their resultant when the angle between them is a) 0° b) 30.0° c) 45.0°



a) 30 N

D)

5) A force of 55 N acts due West on an object. What added single force on the object produces equilibrium?

6) Two forces act concurrently on a point *P*. One force is 400 Newtons due North and the second force is 600 Newtons due West. a) What is the magnitude and direction of the resultant? b) What is the magnitude and direction of their equilibrant?

c = symbol for an electric unit named Coulombs
Write the following numbers:

7) 10 μc 8) 458 ρc 9) 34 μc

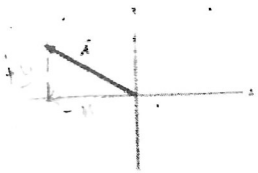
10) A vector force of 58 N at angle 30° north of East is produced by a due East vector and a due North vector? What is the magnitude of the two vectors?

Wafi Hassan P

Vector Components

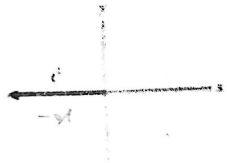
Draw and label the x and y components from the vector diagram shown (1-3)

1)

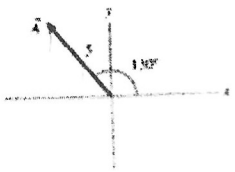


2)

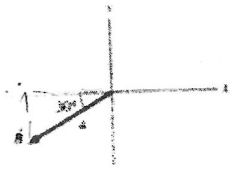
3)



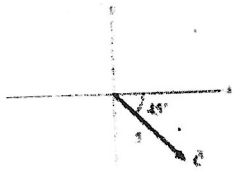
Determine the numerical value of the x- and the y-components of each vector 4-6 (remember to use whole angles).



4) $A_x = 3.214$
$A_y = 3.830$



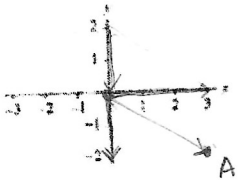
5) $B_x = -3.464$
$B_y = -2$



6) $C_x = 3.54$
$C_y = -3.54$

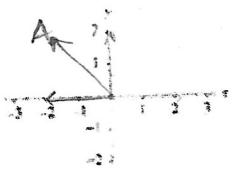
Draw and label the vector created by putting $A_x + A_y$ together.

$A_x = 3, A_y = -2$



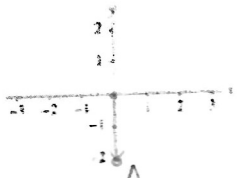
7) $A = (3, -2)$

$B_x = -2, B_y = 2$



8) $B = (-2, 2)$

$C_x = 0, C_y = -2$



9) $C = (0, -2)$

o

√ Components

Wafi Hassan.

Each vector is made up of two components. One component is made up of the motion of the vector in the x-axis direction and the other component is in the y-axis direction. Thus, to add any two vectors we can break each vector into its components and then add the components. The addition of the components will (with the use of Pythagorean Theory and Tan^{-1}) allow us to arrive at an answer and an angle.

1) What (using sine or cosine) are the components of the following vectors (only)?

a) 150 units@ 50 degrees

$X = 150\cos(50) = 96.42$

$Y = 150\sin(50) = 114.91$

b) 130 units@ 140degrees

$X = -130\cos(180-140) = -9$

$y = 130\sin(180-140) = 83$

c) 10 units@ 30 degrees

$X = 10\cos(30) = 5\sqrt{3}$

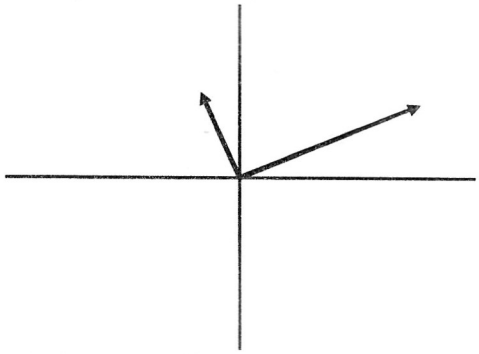
$y = 10\sin(30) = 5$

d) 100 units @210 degrees

$X = -100\cos(210-180) = -86.6$

$Y = -100\sin(210-180) = -50$

2) Two vectors are working together. Vector A is 100 units at 30° while Vector B is 50 units at 120°. A) What are the components of each vector? B) Make a box and fill in the box with each of the components, add them up C) Find the resultant of Vector A and Vector B by adding the components together and using Pythagorean Theory and Tan^{-1}.



	X	Y
vector A	86.6	50
vector B	25	43.3
Total	111.6	93.3

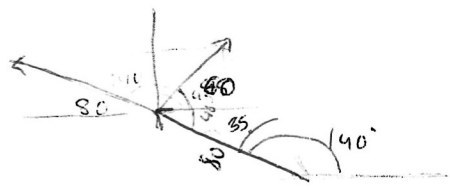
3) A cannon fires a shell at 500 m/s at an angle of 30° above the horizontal. The horizontal component is 433.0127 *and the vertical component is* 250.

4) Two people are pulling on a log. The first person (vector A) pulls with 60 newtons of force at 45°. The second person (vector B) pulls with 80 newtons of force at 140°. After finding each of their components, what is the result of their pulling together (we should have an answer with a number and angle).

$\sqrt{a^2+b^2-2ab\cos(140-45)}$

$= \sqrt{60^2+80^2-2(60)(80)\cos(95)}$

$= 104.1$ N



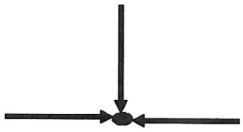
$\cos^{-1}\left(\frac{104.1^2+80^2-60^2}{2(104.1)(80)}\right) = 35.0419°$

∴ 104.1 N at (140 − 35°) = 105°

Wafi Hassan P1.

Vector Six

1) Three forces act on a single point concurrently. The resultant is



All vectors are 20 units

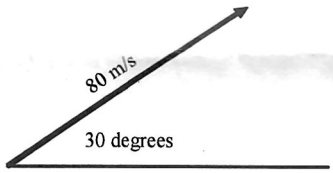
20 units.

2) As the angle between two concurrent forces of 5.0 and 7.0 newtons increase from 0° to 180°, the magnitude of their resultant changes from *1) 0 to 35 N* *2) 2.0 to 12 N* *3) 12 to 2 N* *4) 12 TO 0 N*

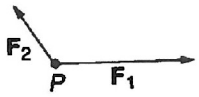
3) As an angle decreases from 180° to 0°, their resultant _____ .
a) increases *b) decreases* *c) remains the same*

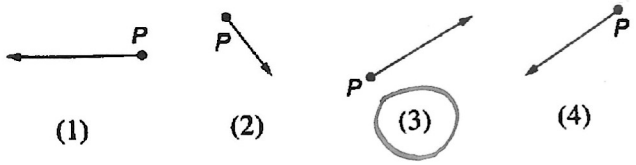
4) What is the vertical component of the velocity vector shown below? ~~80 cos~~ $80\sin(30) = \frac{80}{2} = 40$

5) The maximum number of components that a single vector may be broken into is
A) 1 *B) 2* *C) 3* *D) 4*



6) Which vector best represents the resultant of forces F_1 and F_2 acting concurrently on point P as shown below?





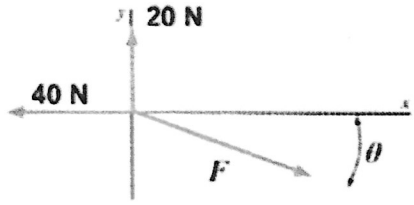
(1) (2) (3) (4)

Vector 16

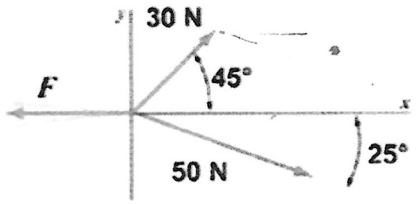
Wafi Hassan.P

1) Find the components of the resultant of the following forces: 15 N at 90°, 8 at 270°, 4 N at 180°, and 20 N at 0°.

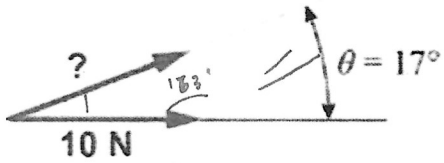
2) Determine the force necessary to make the net force (F) equal to zero.



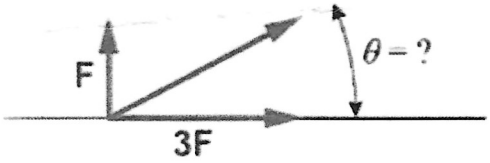
3) Determine the force necessary to make the net force (F) zero in the diagram below.



4) (see below) What magnitude force at a 17° angle above the horizontal will produce a 10 N horizontal component force?



5) At what angle should a force be applied so that its x-component is 3 times that of its y-component?



1) a) 15 N at 90°
X: $15\cos 90°$
$= 0$
Y: $15\sin 90°$
$= 15$ //

b) 8N at 270°
X: $8\cos(270°)$
$= 0$
Y: $8\sin(270°)$
$= -8$ //

c) 4N at 180°
X: $4\cos(180°)$
$= -4$.
Y: $4\sin(180)$
$= 0$ //

d) 20 N at 0
X: $20\cos(0)$
$= 20$
Y: $20\sin(0)$
$= 0$. //

2) $\sqrt{(40\cos(180) + 20\cos(90))^2 + (40\sin(180) + 20\sin(90))^2}$

$= 44.72$ N // at 333.4°

3) $\sqrt{(30\cos(45) + 50\cos(-25))^2 + (30\sin(45) + 50\sin(-25))^2}$

$= 66.53$ N // at.

4) $\frac{10}{\cos(17)} = 10.46$ //

5) $\tan(\theta) = \frac{F}{3F}$

$\therefore \theta = \tan^{-1}(\frac{1}{3})$

$= 18.43°$ //

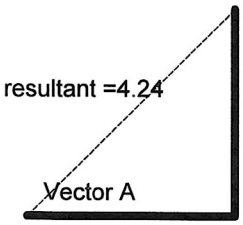
Wafi Hasson P1

Equilibrant and Equilibrium

When an object is in equilibrium it experiences a balancing of forces or there is not a net force. Thus, the sum of all of the forces on the object is zero. The object is neither accelerating nor decelerating. When doing a vector diagram the objective is to solve a problem which is found by finding the resultant. The resultant has a magnitude (how much) and a direction. Sometimes it is necessary to find the force that will be equal to the resultant but opposite in direction. This force will stop, balance or offset the resultant. The force that is equal in magnitude but opposite in the direction and is called the ***equilibrant.***

problem*: find the resultant of two vectors of 3 pounds and 3 pounds that are at right angles to each other. Find the equilibrant to the resultant.*

Two forces acting at once



vector diagram of the two forces

The equilibrant is equal to the resultant but opposite in direction thus the equilibrant is 4.24 pounds and 45° South of West. (OR 225°)

Solve the following:

1) Two forces act on an object. One force is 6 units horizontally. The second force is 8 units vertically. a) Find the resultant of the forces. B) Find the equilibrant.

2) A 62-pound force acts at 30° and a second 62-pound force acts at 60°. a) find the resultant b) find the equilibrant.

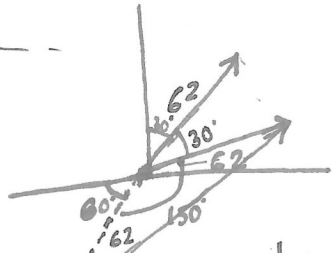
3) Three forces are pulling upon an object at once. The first force is 100 pounds at 30°. The second force is 120 pounds at 75°. The third force is 60 pounds at 135°. What is the resultant of the three forces? What is the equilibrant?

1) $\sqrt{6^2+8^2}$ = 10 units $[\tan^{-1}(\frac{8}{6}) =]$ at 53.13°

B) 10 units at $(53.13+180)^\circ$ = 233.13°

2) A) $\sqrt{62^2+62^2-2(62)^2\cos(150)}$ = 119.77 pounds at 45°

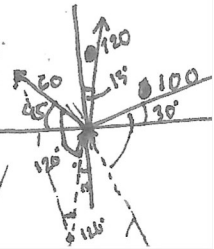
B) 119.77 pounds at $(180+45)^\circ$ = 225°



3) $\sqrt{120^2+60^2-2(120)(60)\cos(120)}$ = 158.75 at $\cos^{-1}\left(\frac{120^2+158.75^2-60^2}{2(120)(158.75)}\right)$ = (20°)+75° = 95°

$R = \sqrt{100^2+158.75^2-2(100)(158.75)\cos(30+180-95)}$ = 220.5 at $\cos^{-1}\left(\frac{100^2+220.5^2-158.75^2}{2(100)(220.5)}\right)$ = (40.13°)+30° = 70.13°

Eq = 220.5 pounds at $(180+70.73)^\circ$ = 250.73°

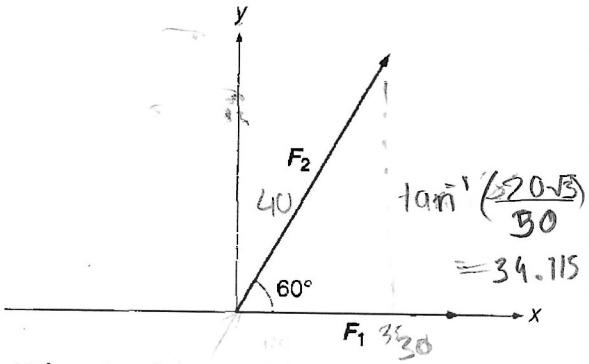


Resolution of Vectors

Wafi Hass

Pre-Laboratory Assignment

1. *Scalars are physical quantities that can be completely specified by their* magnitude
2. *A vector quantity is one that has both* magnitude *and* direction.
3. *Classify each of the following physical quantities as vectors or scalars:*
   a) *Volume* Scalar b) *Force* vector.
   c) *Density* Scalar d) *Velocity* vector.
   d) *Acceleration* vector.



4. *If F_1 stands for a force vector of magnitude 30 N and F_2 stands for a force vector of magnitude 40 N acting in the directions shown in the diagram, what are the magnitude and direction of the resultant obtained by the vector addition using good vector rules?*

$\tan^{-1}\left(\frac{20\sqrt{3}}{30}\right) = 34.715$

$\sqrt{(40\cos(60) + 30\cos(0))^2 + (40\sin(60) + 30}$

$= \sqrt{50^2 + (20\sqrt{3})^2} = 40.509\text{ N} @ 3$

5. *What is the equilibrant force that would be needed to compensate for the resultant force of the vectors F_1 and F_2 that you calculated in Question 4?*

$34.72 + 180 = 214.715 \approx 214.72^\circ$ of 40.509 N.

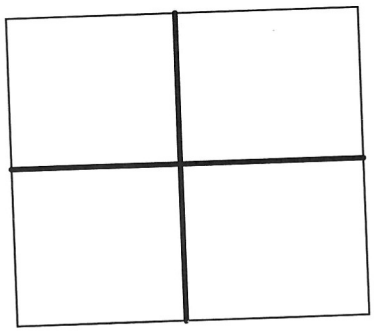
PURPOSE: TO UNDERSTAND VECTORS

CONCEPT: WHEN AN OBJECT IS NOT IN MOTION, IT IS IN EQUILIBRIUM AND THE SUM OF ALL OF ITS FORCES IS ZERO. WHEN TWO OR MORE FORCES ARE PLACED UPON AN OBJECT AND THE OBJECT DOES NOT MOVE, THE SUM OF ALL OF THE FORCES IS ZERO.

MATERIALS: A VECTOR BOARD, PROTRACTOR, PAPER, STRING AND A CIRCULAR RING (PLEASE DO NOT PLACE THE RINGS IN YOUR NOSE), A SET OF WEIGHTS

PROCEDURE: START WITH THE "SET UP" LEVEL THE BOARD AS WELL AS POSSIBLE. ON A PIECE OF PAPER DRAW TWO LINES PERPENDICULAR TO EACH OTHER AND THROUGH THE CENTER OF THE PAPER.

Resolution of Vectors



PLACE THE CENTER POINT OF THE PAPER OVER THE CENTER MARK ON THE BOARD AND PUSH THE PAPER THROUGH

OBTAIN THREE STRINGS AND TIE THEM ONTO THE RING. EACH STRING SHOULD BE LONG ENOUGH TO EXTEND OVER THE VECTOR TABLE. TIE THREE LOOPS NEAR THE END OF THE STRING. THEY SHOULD BE PLACED NEAR THE END OF THE STRING AND BE ABLE TO EXTEND OVER THE VECTOR TABLE.

PLACE THE RING OVER THE CENTER SPIKE AND HAVE ONE OF THE STRINGS ORIENTED OVER THE NORTH VERTICAL LINE.

ACTIVITY ONE

HANG A 60 g MASS CORRESPONDING TO 0° AND ANOTHER 100 g MASS AT 60°. CALCULATE THE RESULTANT OF THE TWO MASSES.

$\sqrt{(60\cos 0 + 100\cos(60))^2 + (60\sin 0 + 100\sin$

$= \sqrt{110^2 + (50\sqrt{3})^2} = 140 \text{ @ } \tan^{-1}\left(\frac{50\sqrt{3}}{110}\right) = 38.20$

1) WHAT IS THE RESULTANT OF THE TWO MASSES HANGING? (include the angle)

140g @ 38.21° .

THEN FIND THE EQUILIBRANT. (PREDICT THE ANGLE AND THE AMOUNT OF THE MASS THAT WILL KEEP THE RING CENTERED AND NOT MOVING)

~~140g @ 218.21°~~

2) WHAT IS THE PREDICTED EQUILIBRANT? 140g @ 218.21.

Resolution of Vectors

WAFI HASSAN
P1.

ST YOUR CALCULATIONS. TO SEE IF YOU ARE CORRECT HANG THE PREDICTED MASS AT THE PREDICTED ANGLE.

ACTIVITY TWO

USING THE SAME PROCEDURE AS IN ACTIVITY ONE, REPEAT THE ACTIVITY USING THE FOLLOWING FORCES

A) 200 g AT AN ANGLE OF 30°, 150 g AT AN ANGLE OF 120°

B) 250 g AT AN ANGLE OF 64°, 100 g AT AN ANGLE OF 280°

$200\sin(30)+150\sin(120) = 229$
$200\cos(30)+150\cos(120) = 9$
$250\sin(64)+100\sin(280) = 126$
$250\cos(64)+100\cos(280) = 126$

3) PREDICT WHAT IS THE EQUILIBRANT OF THE 200 g AND 150 g MASSES HANGING?

250g @ 246.7° .

4) PREDICT WHAT IS THE EQUILIBRANT OF THE 250 g AND 100 g MASSES HANGING?

179g @ 224.83° .

5) TEST YOUR CALCULATIONS. TO SEE IF YOU ARE CORRECT HANG THE PREDICTED MASS AT THE PREDICTED ANGLE. ARE YOUR PREDICTIONS CORRECT? Yes .

Activity Three

Place a pulley at 30° with 150 g on it, one 100° with 200 g on it, and one at 145° with 100 g on it. Determine the equilibrant force and the resultant force using good vector rules.

$F_{equilibrant}$ 329.586g @ 267.7° $F_{resultant}$ 329.586g @ 87.7° .

$F_{x1} = 150\cos 30° + F_{x2} = 200\cos(100) + F_{x3} = 100\cos(145) = 13.25$

$F_{y1} = 150\sin 30 + F_{y2} = 200\sin(100) + F_{y3} = 100\sin(145) = 329.32$ $\tan^{-1}($

$\sqrt{329.32^2 + 13.25^2} = 329.586g$ $180+87.7 = 8$

Activity Four

THIS ACTIVITY IS DESIGNED TO LEARN ABOUT THE COMPONENTS OF A VECTOR. SUSPEND A 70 g MASS AT AN ANGLE OF 210 ° AND BALANCE IT BY SUSPENDING SUFFICIENT MASSES AT 0 ° AND 90 ° RECORD THE (FORCE) MASSES USED. 0° IS FORCE IN THE X DIRECTION (F_x) AND 90 ° FORCE IN THE Y DIRECTION (F_y).

$70\cos 210 = -60.62$
$70\sin 210 = -35$
$\sqrt{35^2 + 60.62^2} = 70 @ 210°$

Need 70 @ 30°
$70\cos 30° = 35\sqrt{3} = 60.62.$
$70\sin 30 = 35$

Resolution of Vectors

F_X 60.62. F_Y 35.

6) FROM THE DATA (F_X AND F_Y) WHAT IS THE RESULTANT OF HANGING MASSES AT 0° AND 90°? 70g @ 30°.

QUESTIONS:

7) A VECTOR OF 25 UNITS IS AT AN ANGLE OF 53° WITH THE X AXIS. WHAT IS THE X AND Y COMPONENTS?

X = 15.045 units $25\cos(53) = 15.045$

Y = 19.97 units. $25\sin(53) = 19.965$

8) IF THE X COMPONENT OF A VECTOR IS 12.5 UNITS AND ITS Y COMPONENT IS 8.2 UNITS, WHAT IS THE MAGNITUDE AND DIRECTION OF THE VECTOR?

$\sqrt{12.5^2 + 8.2^2}$ $\tan^{-1}(\frac{}{})$

$= 14.94$ $= 33.2$

VECTOR 14.94 units at 33.26°.

9) ATTEMPT THE CHALLENGE IN THE FRONT OF THE ROOM.

VECTOR REVIEW

Wafi Hassan

$15\cos 100 = -2.6$
$15\sin 100 = 14.77$
$100\cos 15 = 96.6$
$100\sin 15 = 25.89$

1) Using good graph skills, draw a vector 15° N of W with a magnitude of 100 units.

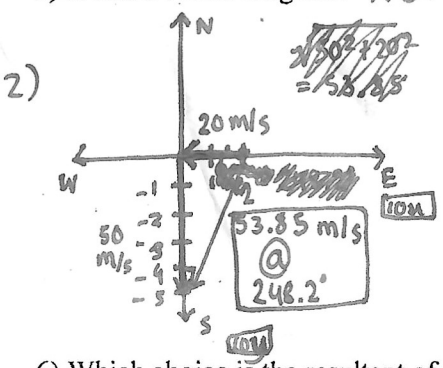
2) Using good graphing skills, draw a vector diagram show a car moving south at 50 m/s and a cross wind from the east toward the west at a magnitude of 20 m/s. show the resultant vector $\sqrt{50^2+20^2} = 53.85$ $\tan^{-1}\left(\frac{50}{20}\right) =$

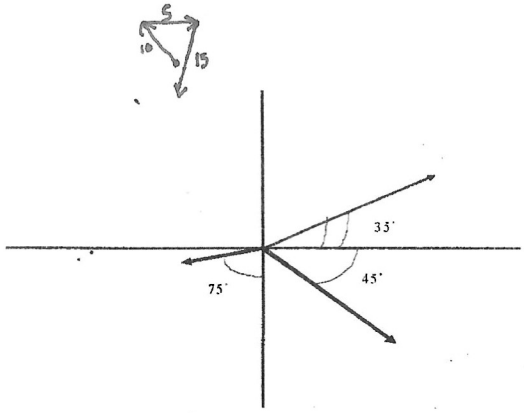
3) A person leaves his home and travels 10 miles at an angle of 45° North of West. He then travels 5 miles due East. His last change in direction is 15 miles 60° South of West. What is his final location relative to his starting point?

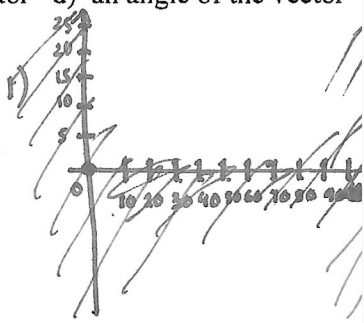
$10\cos(90+45) + 5\cos(0) + 15\cos(180+60) = -9.57$ $10\sin(90+45) + 5\sin(0) + 15\sin(180+60)$

4) Every vector diagram includes a) a scale b) a starting point c) a magnitude of the vector d) an angle of the vector
e) all of the above

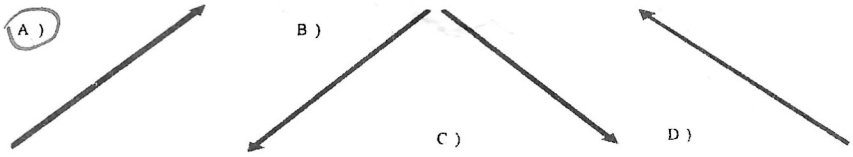
5) Is this a vector diagram? No.







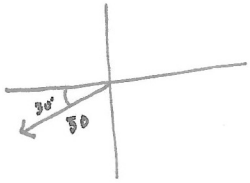
6) Which choice is the resultant of the vectors 3 units North added to 4 units East?



7) Using the above choices in problem 6, which is the equilibrant? D

8) Complete the box. A vector is 50 units 60° South of West. Its components are?

X	Y
-43.3	-25

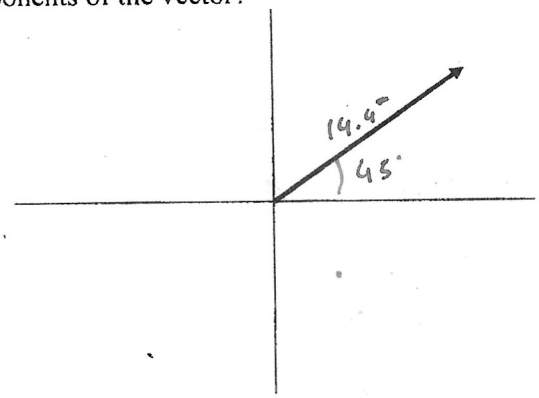


$180+30 = 210°$

$50\cos(210) \quad | \quad 50\sin(210)$

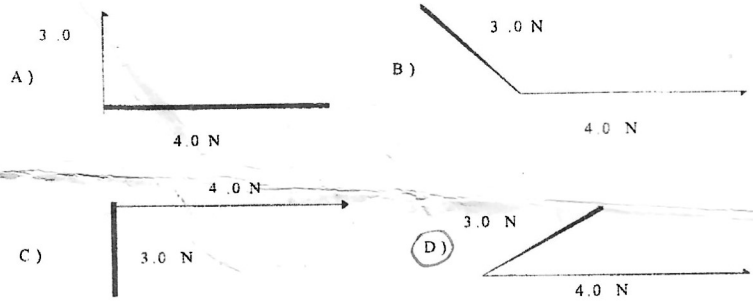
VECTOR REVIEW

9) The two components are at right angles to each other and have a resultant of 14.14. the angle of the resultant and the X-axis is 45°. What are the two components of the vector?



X: $14.4 \cos 45^\circ$
$= 10.18$
Y: $14.4 \sin 45^\circ$
$= 10.18$.

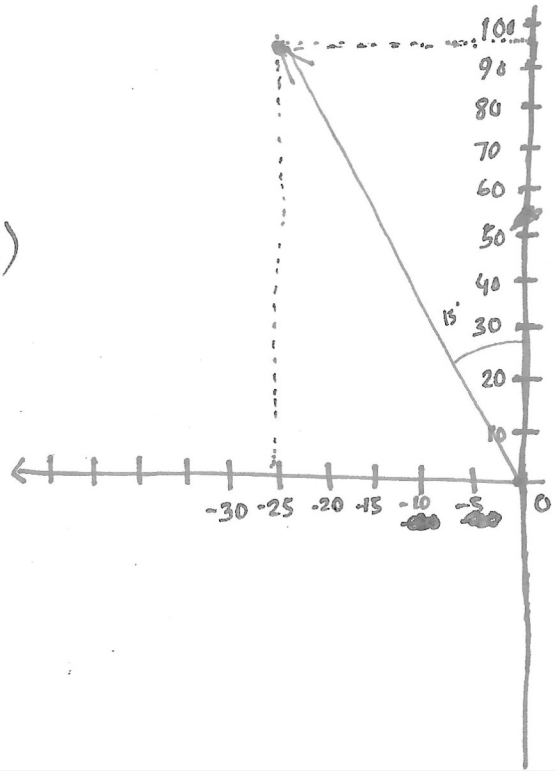
10) A 3.0 Newton force and a 4 Newton force act together at a point. In the choices provided below, which diagram would provide the greatest net force?



11) A quantity that has only magnitude is called a vector. True or False

12) A vector sum is called the resultant. True or False

1)



2)

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1) a
2) d
3) e
4) b
5) e
6) c
7) e
8) b
9) a
10) a
11) 4.956 m/s @ 2.845°
12) a) 9.24 m/s NO
13) b) 76.81° NO
14)
15)
16)
17)
18)
19)
20)

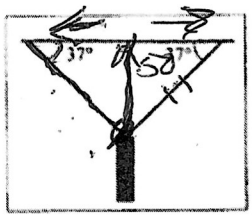
21) 100
22)
23)
24)
25)
26)
27)
28)
29)
30)
31)
32)
33)
34)
35)
36)
37)
38)
39)
40)

Vector Test '21

Wafi Hassan

1) Three forces, each having a magnitude of 30 lb., pull on an object in directions that are 120 ° apart from each other. Which one of the following statements must be true? a) the resultant force must be zero. b) the resultant force is greater than 30 lb. c) the resultant force is equal to 30 lb. d) the resultant force is less than 30 lb

2) A traffic light of weight 100 N is supported by two ropes as shown in the diagram. What are the tensions in the ropes? a) 50 N b) 63 N c) 66 N d) 83 N e) 100 N



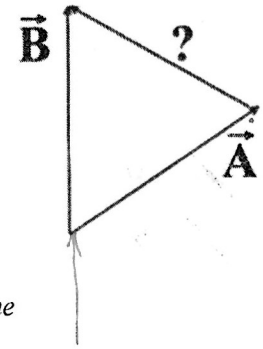
$2T\sin(37) = 100$

3) The resultant of two vectors is smallest when the angle between them is a) 0° b) 45 ° c) 60 ° d) 90 ° e) 180 °

4) If a ball is thrown with a velocity 25 m/s at an angle of 37° above the horizontal, what is the horizontal component of the velocity? a) 25 m/s b) 20 m/s c) 18 m/s d) 15 m/s e) 10 m/s

5) A boat whose speed in still water is 8 m/s, is directed (perpendicular) across a river with a current of 6 m/s. What is the speed of the boat as it crosses the river because of the current?
a) 2.7 m/s b) 5.3 m/s c) 6 m/s d) 8 m/s e) 10 m/s

6) In the diagram shown, the unknown vector is a) A + B = b) A - B = c) B - A = d) A x B =

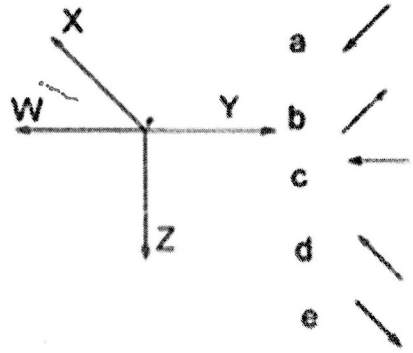


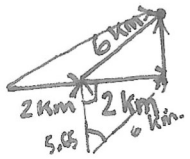
7) If you walk 6 km in a straight line in a direction north of east and you end up 2 km east and several kilometers north. How many degrees north of east have you walked? a) 18 ° b) 19 ° c) 45 ° d) 60 ° e) 71°

8) As the angle between two concurrent forces increases from 45 ° to 90 °, the magnitude of their resultant a) increases b) decreases c) remains the same

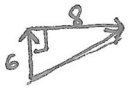
9) Two 10 N concurrent forces act on a point at an angle of 180 ° to each other. The magnitude of the resultant of the two forces is a) 0 N b) 10 N c) 18 N d) 20 N

10) Vectors W, X, Y, and Z are acting concurrently at point P. What is the resultant of their interaction?

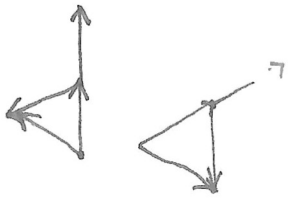




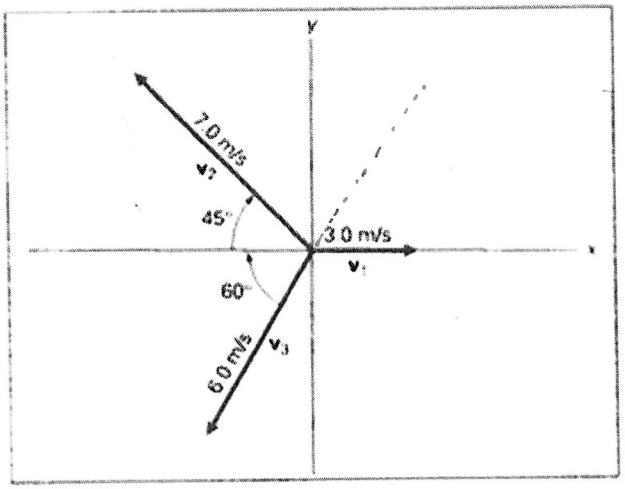
$\sqrt{6^2 - 2^2} = 4\sqrt{2}$



$2\cos\theta + 6\cos(\alpha)$

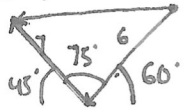


Vector Test '21



11) Using diagram to the left, find the equilibrant to the three vectors. Please include not only the magnitude but also the direction.

$\sqrt{(7\cos(135°)+6\cos(240°)+3\cos(0))^2+(7\sin(135°)+6\sin(240°)+3\sin(0))^2}$



$=\sqrt{(-4.95)^2+(-0.246)^2}$ $\tan^{-1}\left(\frac{-0.}{-4.}\right.$

$=182.84$

$=4.956$ m/s. $E_q = 2.845°$

Extra Credit: 3 pts added to test for every correct question.

A torpedo leaves a ship at 2.1 m/s initially aimed at a target 85 meters away East. The current of the ocean flows perpendicular to this motion at .9 m/s North.

d = vel. / time

a) What will be the magnitude of the velocity vector that takes both the torpedo's velocity and the current into account?

b) At what angle will the resultant velocity be given to the torpedo's velocity (relative to the x axis)?

c) How far off course will the torpedo be when it reaches 85 m.

d) At what angle should the angle be aimed to compensate for the current?

$\frac{d}{s} = \frac{85}{2.1} =$